Final Draft

Regional Science Workshop on Animal Feeding Operations (AFOs) - Science and Technical Support Needs

December 6-9, 2004

College Park, Maryland

Goals of Workshop

1) To bring the available technical tools to EPA staff to address their highest priority needs associated with AFOs
2) To identify unmet basic and applied research, technical support, training and other needs associated with the regional priorities, and develop a plan to address these needs
3) Capture the most relevant information from the numerous other workshops which have been held on these questions and bring the information to EPA staff

Monday, Dec. 6th

Poster Session

1:00- 7:00 - Interactive Poster Session/Social on Available Tools to meet technical needs associated with 10 Priority Regional Research and Technical Issues. Posters shown in the agenda for each session will be clustered by Priority Question with tables for small group discussions. This is the primary opportunity for viewing posters and discussions.

(Food and Beverages will be served at 5:30)

(The term tools is meant to be very broad and include: literature syntheses, assessment approaches, training, decision support tools, models, computer programs, expert contacts, etc.).

Tuesday , Dec 7th

8:00 Opening Comments - Jon Scholl, Counselor to EPA Administrator on Agr. Issues
8:15 Goals and Logistics - Ronald Landy, EPA/ORD/Region III
8:30 Facilitator Instructions - Mindy Lemoine, EPA/Region III, Workshop Facilitator

Session I - Air Emission Characterization & Management

Posters

1) Ambient Ammonia Monitoring Technologies - EPA/ORD/ Environmental Technology Verification Program - Ray Frederick/EPA/ORD/NRMRL
2) Characterization of Air Emissions from Swine CAFOs - Bruce Harris, EPA/ORD/NERL
3) Ammonia and PM2 Variability in Agricultural Regions - John Walker, EPA/ORD/NRMRL
4) Estimating Dry Deposition of Ammonia - John Walker, EPA/ORD/NRMRL
5) Verification of Ammonia Emissions Modeling - Tom Pierce, EPA/ORD/NOAA
6) National Emission Inventory - Ammonia Emissions from Animal Husbandry Operations - Bill Schrock, EPA/OAQPS
7) The Scientific Basis for Estimating Emissions from AFOs - NAS Report - Bill Schrock
8) National Livestock Air Emissions Study - Al Heber, Purdue University
9) Testing Methods for Estimating VOCs from Lagoons - Cary Secrest, EPA/OECA
10) Common Exposures and Ambient Measurement of Air Emissions from AFOs - Cary Secrest
11) Guidance on Transferring Data Between Different Geographic Areas - What is Regionally Specific?- Al Heber, Purdue
12) Dust Emission and Microbial Sampling - Frank Mitlohner, U.C. Davis
13) Web-Based Reference Manager Database on Livestock Air Quality Issues - Frank Mitlohner
14) When to Sample? Where to Sample? Which Model? The Problems with CAFO's - Dick Pfeiffer, USDA/Soil Tilth Laboratory
15) Assessing Ambient Atmospheric Ammonia Concentrations: Annular Denuder Technology and Passive Filters - Wayne Robarge, NC State Univ. and John Walker- EPA/ORD/NRMRL
16) As Assessment of Ammonia Emissions from Alternative Technologies for Swine Waste - Wayne Robarge, V.P. Aneja, and P. Arya /NC State University, and L. Todd and K. Mottus/ UNC

1. What are the most significant air pollutants (e.g., dusts, volatile organic compounds and ammonia), their sources (including housing, storage ponds, lagoons, litter piles, and land application fields) and their emission rates from AFO operations? What metrics, methods, and models should we use in the future to quantify and monitor these emissions to better understand their relationship to atmospheric deposition and the formation of ground-level ozone and PM 2.5?

9:00-9:15 **Regional Perspective** - Kerry Drake - EPA Region IX
(The goal of this presentation is to highlight why the question is so important to regional staff in carrying out their daily duties)

9:15 - 9:30 **National Perspective** - Bill Schrock - *EPA/OAR*
(The goal is to provide a national perspective from EPA Hqs, i.e., what are their expectations from the Regions in implementing National initiatives relevant to this question and what they see coming down the line)

9:30 - 10:15 **State of the Science** - Al Heber, Purdue University
(This presentation is meant to give a very broad overview of the state of the science and discuss how the projects/products in the posters and the available science, meet the needs raised by the regions)

10:15-10:30 - Break

2. **What are the meteorological and other variables that affect the emissions, transport, and deposition of AFO-related pollutants?**

10:35 - 10:50 Regional Perspective - Michael Davis, EPA Region VII
10:50 - 11:20 State of the Science - Thomas Pierce, NOAA/Atmospheric Sci. Modeling Division
11:20 - 12:00 Panel Discussion for Questions 1 & 2 - Have the needs been met and remaining technical needs? - James Liebman (9), Bill Schrock (EPA/OAR), Michael Davis (EPA/R-7), Al Heber (Purdue Univ), Thomas Pierce (NOAA), and Carey Secrest (EPA/OECA)

(This session is meant to identify the remaining unmet science/technical needs to lay the groundwork for the discussions on the last day to develop a collaborative cross-Agency plan to address these remaining needs. In addition, these sessions will be used to provide a perspective on provocative issues raised in the earlier portions of the discussion.

12:00 -1:30 - Lunch

Clean Air Act Enforcement Settlement w/ Buckeye Egg Farm - *How ambient measurements helped EPA forge an agreement for reducing emissions of PM and ammonia from this large-scale poultry operation* - Cary Secrest, EPA/Office for Enforcement and Compliance and Al Heber/Purdue University

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Session II - Contaminant Source Tracking

Posters

1) Tracing Causes of Hypoxia Using Isotope Techniques - Carol Kendall, USGS/ Menlo Park
2) Tracing Sources of Nitrate and Organic Matter to the San Joaquin River - C. Kendall
3) Use of Forensic Isotopes - C. Kendall
4) Non-Library Based Molecular Methods for Microbial Source Tracking - Jorge Santodomingo, USEPA/ORD/NRMRL
5) Using DNA to Identify Sources of Pathogen Contamination at an EPA Regional Laboratory- Bonita Johnson, EPA/Region IV
6) Microbial Source Tracking by Antibiotic Resistance Analysis at the Turkey Creek Watershed in NW Oklahoma - Yolanda Olivas and Bart Faulkner, USEPA/NRMRL
7) Recent Advances in Isotope Techniques for Identifying Sources of Phosphorous - Bill Showers, NC State University

3. **What methodologies can be used to distinguish the source(s) of nitrogen and other contamination (e.g., pathogens) in ground or surface waters, i.e., specific animal species, septic tanks, fertilizers?**

1:30 - 1:45 Regional Perspective - Lee Thomas, EPA Region IV
1:45 - 2:00 National Perspective - Paul Shriner, USEPA, Office of Water
State of the Science
2:00 - 2:45 N Source Tracking - Carol Kendall, USGS, Menlo Park

2:45 - 3:10 **Microbial Source Tracking Guide** - Jorge Santodomingo, ORD/NRMRL

3:00 - 3:30 **Panel Discussion - Have the needs been met and remaining technical needs?**
- Bob Brobst (EPA/R-8), Bonita Johnson (EPA/R-4), Jorge Santodomingo (EPA/ORD), Carol Kendall (USGS), Paul Shriner (EPA/OW) and Sam Myoda (Delaware)

3:30 - 3:45 BREAK

Session III - Pharmaceuticals and Pathogens

Posters

1) Endocrine Disruption in Fish Following Exposure to Aqueous Poultry Litter - Lance Yonkos, UMD
2) Risks from Arsenic Used in Poultry Feed - Tracy Hancock, USGS
3) Environmental Impacts of Endocrine Disrupting Compounds Associated with AFOs - Jim Lazorchak, USEPA/NERL
4) Public Health Impacts of Large-Scale Animal Operations - Ken Kephart, Penn State Univ.
5) Animal Drug Approval - Chuck Eirkson, FDA, Center for Veterinary Medicine
6) Persistence of Antibiotics in Lagoons/Ammended Soils Near AFOs - M. Meyers & Dana Koplin,USGS
7) Summary of a 5-Year Study on Antibiotics at CAFOs - Mike Meyer,USGS
8) Antibiotic Resistance and Residues in Swine CAFOs in North Carolina - Mike Meyers/and Dana Cole, USGS
9) Antibiotic Resistance in Poultry Farms in the Delmarva - Ellen Silbergeld, Johns Hopkins University
10) Waterborne Infectious Diseases that may be Transmitted to Humans from Animal Farm Operations - John Cicmanec, EPA/ORD/NRMRL
11) Veterinary Pharmaceuticals: Potential Environmental Impact and Treatment Strategies - John Cicmanec, EPA/ORD/NRMRL
12) Endocrine Disrupting Chemicals in West Virginia Waterways: Seasonal Comparisons for Agricultural, Industrial, and Residential Areas - John Cicmanec, EPA/ORD/NRMRL
13) AFO Related Pathogen Research and Technical Needs Identified at the Recent Kansas City Workshop - Dick Hegg, USDA, CSREES
14) Endocrine Disrupting Effects of Cattle Feedlot Effluent on the Fathead Minnow, *Pimephales promelas* - E.F. Orlando, A.S. Kolok, G. Binczik, J. Gates, L.E. Gray, M. Horton, C. Lambright, and L.J. Guillette, Jr.
15) Pathogen Reductions in Wastewater from Swine Facilities - Pat Milner, USDA/ARS
16) Evaluation of an Alternative Swine Waste Treatment Technology in North Carolina for the Reduction of Microbial Indicators and Salmonella Pathogens - C.A. Kikirdopulos, O.D. Simmons and Mark Sobsey, University of North Carolina (UNC)
17) Antimicrobial Resistance of E. coli and Salmonella on Swine Farms in Eastern North Carolina - M.A. Sullivan (UNC)
18) Antibiotic Resistance in Salmonella from North Carolina Swine Feeding Operations - L.M. Cassanova, V.R. Hill, and M.D. Sobsey,(UNC)
19) Comparison of Methods for Detection of Fecal Coliforms and E.coli in Agricultural and Municipal Waste Waters - R.J. Chihara and M.D. Sobsey, UNC
20) Investigation of Airborne Releases of Microbial Contaminants from Swine Farms in North Carolina - Gwangpyo Ko and O.D. Simmons and Mark Sobsey, UNC

4. **What specific analytic methods (***and associated sampling, preservation and preparation techniques***) should be used in an environmental setting for the veterinary pharmaceuticals and microorganisms most likely to be found in the environment and most likely to be linked to adverse human health effects, e.g., drugs such as tetracyclines, sulfonamides, and trenbolone; and pathogens such as *Cryptosporidium parvum, Campylobacter spp., and E. coli O157:H7*?**

3:50 - 4:05 **Regional Perspective -** Bob Brobst, EPA Region VIII
4:05 - 4:30 **State of the Science - Pharmaceuticals -** Mike Meyers, USGS
4:30 - 5:00 **State of the Science - Pathogens** - Chip Simmons, UNC
5:00 - 5:30 **Panel Discussion - Have the needs been met and remaining technical needs?** Bob Brobst, Mike Meyers, Chip Simmons, Tracy Hancock

Wednesday, December 8th **(Pharmaceuticals and Pathogens, Cont'd)**

8. How can we determine the fate, transport, and environmental impacts of pharmaceuticals and pathogens? Are there technologies to mitigate exposures?

8:00 - 8:15 **Regional Perspective** - John Larson, EPA Region VIII
8:15 - 8:35 **Fate and Transport of Veterinary Pharmaceuticals** - John Cicmanec, EPA/ORD/NRMRL -
8:35 - 8:55 **Overview of Pathogens Associated with AFOs, What Organisms, Fate and Trasport** - Mark Sobsey, UNC
8:55 - 9:15 **Environmental Concerns Associated with Veterinary Pharmaceuticals - the Animal Drug Approval and Monitoring Process - Collaboration with FDA to Address Concerns from EPA Regions regarding Veterinary Pharmaceuticals** - Greg Beatty, EPA/OW and Charles Eirkson, FDA/Center for Veterinary Medicine
9:15 - 9:45 **Panel Discussion - Have the needs been met and remaining technical needs?** - John Cicmanec(EPA/ORD), Mark Sobsey (Univ. North Carolina), Mike Meyers (USGS), John Larson (EPA/R-8) and Chuck Eirkson (FDA)

Break 9:45 - 10:00

9. **What is the strength of the evidence that demonstrates linkages between exposures to AFO contaminants and incidents of disease, especially infectious diseases caused by pathogenic organisms originating from AFO wastes (other than acute problems where it is obvious that agricultural runoff has entered drinking water supplies)?**

10:00 - 10:15 **Regional Perspective -** Stephanie Harris, EPA Region X

10:15 - 10:35 **Health Concerns Associated with Airborne Exposure to AFO Contaminants**- Charles Purdy, USDA/ARS

10:35 - 10:55 **Waterborne Infectious Diseases that May be Transmitted to Humans from Animal Feeding Operations** - John Cicmanec, USEPA/ORD/NRMRL

10:55 - 11:15 **Investigating Disease Outbreaks Associated with AFOs** - Rebecca Caulderon/Gunther Craun, USEPA/ORD/National Health and Environmental Effects Research Laboratory

11:15 - 11:45 **State of the Science -** Ellen Silbergeld, Johns Hopkins Univ., School of Public Health

11:45 - 12:15 **Panel Discussion - Have the needs been met and remaining technical needs? What are the critical questions that need to be answered to move beyond the rhetoric associated with this issue?**

-National Pork Producers Council - TBD
- Western United Dairymen - Paul Martin
- Ellen Silbergeld - Johns Hopkins School of Public Health
- Charles Purdy - USDA - Agricultural Research Service
- Mark Sobsey, University of North Carolina
- *CDC Representative - TBD*
- John Cicmanec, USEPA/ORD/NRMRL

12:15 - 1:30 Lunch

Session IV - Risk Management

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6. What tools (i.e., models, software) are available to farmers, watershed authorities, consultants and other stakeholders that can help them identify specific conditions (e.g., weather, soil type, hydrogeological characteristics) and geographical locations where animal feeding operations would present a higher risk to water quality?

Posters

1) Predicting manure spreading days using climate and soils data in Wisconsin - Daniel McCrory and Marl Powell, USDA, ARS
2) Use of Satellite Imagery to Identify CAFOs and Vulnerable Ecosystems - Don Garofolo, USEPA/ORD/NERL
3) Guidance on Deciding on Whether Manure and Wastewater from CAFOs May be Surface Applied in the Winter - Steve Jann, EPA, Region V
4) The Potential for Nitrate Contamination of Ground Water at Swine CAFO Waste Land Application Sites - Can Comprehensive Nutrient Management Plans Mitigate Risk? - Elyse Striz - USEPA/ORD/NRMRL
5) Using Weather Information to Minimize Nutrient Runoff Risk - Ray Massey, Chris

Boessen and John Lory/ Univ. Missouri
6) Internet Based GIS Site Evaluation Tools to Manage Environmental Risk - John Lory and Ray Massey/ Univ. Missouri
7) Challenges of Multi-Media Modelling at CAFOs - Steve Kraemer, EPA/ORD/NERL

1:30 - 1:45 **Regional Perspective** - Steve Jann - EPA Region 5
1:45 - 2:00 **National Perspective** - Al Havinga - EPA/Office of Enforcement and Compliance
2:00 - 2:45 **State of the Science** - Tom Hunt, University of Wisconsin
2:45- 3:15 **Panel Discussion - Have the needs been met and remaining technical needs?** - Steve Jann (EPA/R-5) Elyse Striz (EPA/ORD), Al Havinga (EPA/OECA), Rick Wilson (Ohio) and Tom Hunt (Univ. Wisconsin)

3:15-3:30 **BREAK**

Session V - Manure Management

5. What are the most effective strategies and practices for minimizing the movement of pollutants from animal confinement areas, manure storage areas, and land applications of manure into surface and ground waters and limiting emissions into the atmosphere? Include:

a. How reducing entry into one media may affect loadings into other media;
b. For land application of manure, how pollutant movement is affected by (1) the form and amount of manure that is applied, (2) the timing, location, and method of application, and (3) the presence or absence of tile drainage systems in land application fields; and
c. Consideration of the costs and ease of implementation of the identified technologies and practices

Posters
1) Dairy diet manipulation to reduce manure N & P levels and Ammonia and P runoff losses - Mark Powell, USDA/ARS
2) Composting to Manage Mortality - Ken Staver, Univ. Maryland
3) What we are doing now is not working! - Tom Simpson, Univ. MD
4) Production and Storage Strategies for Controlling Ammonia Emissions - Ken Kephart, Penn. Univ.
5) Solids Separations Technology for Swine Waste - Ray Frederick, EPA/ORD/NRMRL
6) Manure Management Planner - Brad Joern, Purdue University
7) Spatial Nutrient Management Planner - John Lory - Univ. of Missouri
8) Comprehensive Nutrient Management Planner, Writing Plans -Glenn Carpenter, USDANRCS
9) The Potential for Nitrate Contamination of Ground Water at Swine CAFO Waste Land Application Sites - Can CNMPs Mitigate the Risk? - Steve Hutchins/Mark White/Elize Striz, EPA/ORD/NRMRL
10) NRCS AFO Technical Bulletins - How Practices are Implemented under EQUIP and Tech Asistance Programs - Jerry Lemunyon - USDA/NRCS
11) Separation of Solids, Nitrification and Extraction of Phosphorus at Swine Facilities - M.B.

Vanotti, A.A., Szogi, P.D. Millner ,P.G. Hunt, A.Q. Ellison, USDA/ARS
12) Use of Composting to Reduce or Eliminate Liquid Storage at Dairy, Swine and Poultry Production Facilities - Frederick C. Michel and Harold Keener, Ohio State University
13) Effectiveness of Gravel Filters in Reducing Contaminants in Field Runoff. - Mark Dittrich, Minnesota
14) Drainage and the Environment- Professor Gary Sands, University of Minnesota- Dept. of Biosystems and Agricultural Engineering

3:30 - 3:45 **Regional Perspective** - Abu Senkayi - EPA Region VI
3:45 - 4:00 **National Perspective** - Roberta Parry, EPA/OW
4:00 - 4:30 **State of the Science -** John Haines - EPA/ORD/NRMRL
4:30 - 5:00 **Panel Discussion - Have the needs been met and remaining technical needs?** - Abu Senkayi (EPA/R-6), Roberta Parry (EPA/OW), John Haines (EPA/ORD), Frank Humenik (N.C. State), Mark Dittrich (Minnesota)

Thursday December 9 (Risk Management Session - cont'd)

7. What are the best alternative uses of manure, other than land application? Consider the:

Posters
1) The Feasibility of Pellitizing Manure and the Regional and National Market - Tom Ferguson, Agrochemicals Inc
2) Using Poultry Litter to Generate electricity - Carl Strickler, U.S. Division, Fibrowatt
3) Anaerobic Digestion at Swine Facilities - Len Bull, NC State
4) Using Gasification to Produce Power from Dairy and Poultry Waste - Lew Carr, Univ of MD
5) Economics of Alternative Uses of Manure - Kelly Zerig, N.C. State
6) Waste to Energy Systems Using CAFOs Anaerobic Digester Gas - Tim Hansen/Southern Research Institute
7) Using Anaerobic Digestion to Generate Energy from Dairy Waste - Paul Martin, Western United Dairymen

8:30 - 8:45 **Regional Perspective** - Hank Zygmunt, Region III
8:45 - 9:00 **National Perspective** - Roberta Parry, EPA Office of Water
9:00 - 9:40 **State of the Science -** Frank Humenik**,** NC State, Center for Manure Management
-Biodiesel/Smithfield Manure Management Programs - Garth Boyd, Smithfield
-Technologies at Premium Standard Farms - Dave Townsend**,** Premium Std. Farms
9:40 - 10:15 **Panel Discussion - Have the needs been met and remaining technical needs?** Hank Zygmunt (EPA/R-3), Roberta Parry (EPA/OW), Frank Humenik (NC State), Kelly Zerig (NC State)**,** Len Bull (NC State**)**

10:15 - 10:30 - Break

10. **What environmental assessment methodologies/approaches are available to evaluate farming operations and practices in order to determine impacts? Determine the contributions of these practices toward causing, or effectiveness in preventing, adverse environmental consequences?**

Posters
1) Farm Asyst and 10 State National Project- Bill Bland, University of Wisconsin
2) National Livestock EMS and Livestock and Poultry Environmental Stewardship Program- TBD
3) Dairy Cattle AFO Environmental Assessment -Deanne Meyers - USDA, Davis, California
4) Conservation Security Program Self Assessment - Dave Webster, USDA, NRCS
5) Pro-Dairy/Agricultural Environmental Management Program in New York -Kurt Gooch, Cornell U.
6) On Farm Assessment and Environmental Preservation Program - Alan Stokes/ Environmental Management Solutions
7) Idaho State's OnePlan - Wayne Newbill, Idaho Association of Water Conservation Districts

10:30 -10:45 **Regional Perspective -** Lisa McKinley**--** USDA CREES Liaison/Connie Roberts EPA Region IV
10:45 -11:00 **National Perspective -** Greg Beatty **-** EPA /OW
11:00 -11:30 **State of the Science** - Mark Risse, University of Georgia
11:30 - 12:00 **Panel Discussion - Have the needs been met and remaining technical needs?** Mark Risse (UGA), Connie Roberts (EPA/R-4), Greg Beatty (EPA/OW),

General Posters
1) USDA Environmental Research and Technical Support Programs - Dick Hegg/USDA/CREES
2) USEPA Office of Water Funded Projects - Roberta Parry, EPA/ Water Management Division
3) USEPA OAR Funded Projects - Bill Schrock, EPA/OAR
4) NRCS Conservation Practice Standards -TBD
5*)* USEPA Agricultural Assistance Center - Ginah Mortensen

Regional Science Workshop Adjourned - All Welcome to stay for the afternoon Interagency Planning Session

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1:00-4:00 **Collaborative Research Planning Session to Meet the Unmet Technical Needs Identified During the Panel Sessions**

This will be a focused planning session between EPA Offices, USDA components, USGS and others to plan a path for collaboratively meeting the remaining technical needs, and leaving the meeting with a mechanism to maintain the dialog and implement the plan.

1:00-1:30 Overview of funding programs in different agencies - 1 page summaries will be provided ahead of workshop on Types of Programs, Associated Funding, External vs. Internal, Competition, etc.

Brief Presentations on research programs

USDA ARS - Bob Wright
USDA CSREES - Dick Hegg
USDA NRCS - Sheryl Kunickis
Academia - Deanne Meyer, Univ. Calif. Davis - S-1000 Prgm Lead
USGS - Mike Meyers, USGS
CDC - TBD, CDC
FDA - Chuck Eirkson
NOAA - Dave Whitall
EPA ORD- Ben Blaney, John Haines, L. Staley, Doug McKinney, Teresa Harten, NCER (TBD)
EPA Air, Water, and Compliance Program Offices - Bill Schrock, Roberta Parry & Carey Secrest

1:30 - 2:00 - Discussion on List of Remaining Needs and if they are in Appropriate "Bins", i.e., Basic Research, Applied Research, Technology Transfer, Technology Translation,
2:00 - 3:00 - Opportunities for incorporating needs into existing/planned research programs
3:00 - 3:30 - Development of new research efforts to meet remaining needs
3:30 - 4:00 - Developing a mechanism to continue dialog and implement research and tech transfer plans

Adjourn